Amendments to the Claims

Please amend the claims as follows. This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (previously presented) An optical data transmission system comprising:

a. a data transmission portion including:

(i) an optical comb generator for generating a comb of discrete optical tones;

(ii) the data transmission portion being arranged in a plurality of segments, each segment of the data transmission portion including at least:

(a) an array of lasers, with each laser in the array of lasers in each segment being injection locked to an optical tone in the comb generated by the optical comb generator;

(b) a data source providing data for modulating the light generated by a majority but less than all of the lasers in the array of lasers in each segment; and

(c) a frequency shifter for frequency shifting at least one laser in the array of lasers in each segment, the frequency shifter shifting cooperating with the at least one laser in the array of lasers in each segment to generate a frequency-shifted unmodulated reference signal which occurs in the frequency domain between the discrete optical tones generated by the optical comb generator;

(iii) the data transmission portion also including multiplexers for combining outputs of the modulated lasers and the frequency-shifted unmodulated reference signal and the comb of discrete optical tones onto at least two optical paths;

b. a data receiving portion including:

(i) at least two demultiplexers for demultiplexing signals on the at least two optical paths;

(ii) the data receiving portion being arranged in a plurality of segments, each segment of the data receiving portion including at least:

(a) a photodetector for detecting demultiplexed modulated signals from at least one of the demultiplexers;

(b) a photodetector for detecting demultiplexed unmodulated signals from at least another of the demultiplexers;

(c) a filter array associated with each photodetector in each segment, the filter array selecting a desired modulated tone and an associated desired unmodulated tone between the discrete optical tones generated by the optical comb generator; and

(d) a mixer for detecting the filtered demultiplexed modulated signals and the filtered demultiplexed unmodulated signals to recover at least a portion of the data provided by the data source.

2. (original) The optical data transmission system of claim 1 wherein the filter array in the data receiving portion comprises an array of bandpass filters and an array of switches for selectively enabling the filters.

3. (original) The optical data transmission system of claim 2 wherein the array of switches is an array of MEM switches.

4. (previously presented) The optical data transmission system of claim 1 wherein the light generated by the majority but less than all of the lasers in at least one segment is modulated by modulating the majority but less than all of the lasers in the array of lasers.

5. (original) The optical data transmission system of claim 1 wherein the lasers in at least one segment are laser diodes.

6. (previously presented) An optical data transmitter comprising:

(a) an optical comb generator for generating a comb of discrete optical tones;

(b) at least one transmitter segment, said at least one transmitter segment and any additional transmitter segments including at least:

(i) an array of lasers, with each laser in the array of lasers in each segment being injection locked to an optical tone in the comb generated by the optical comb generator;

(ii) a data source providing data for modulating the light generated by a majority

but less than all of the lasers in the array of lasers in each segment;

(iii) a frequency shifter for frequency shifting at least one laser in the array of lasers in each segment, the frequency shifter shifting cooperating with the at least one laser in the array of lasers in each segment to generate a frequency-shifted unmodulated reference signal which occurs in the frequency domain between the discrete optical tones generated by the optical comb generator;

(c) a first multiplexers for combining outputs of the modulated lasers onto a first optical path; and

(d) a second multiplexer for combining frequency-shifted unmodulated reference signals onto a second optical path.

7-8. (canceled)

9. (previously presented) The optical data transmitter of claim 6 wherein the light generated by the majority but less than all of the lasers in at least one segment is modulated by modulating the majority but less than all of the lasers in the array of lasers.

10. (original) The optical data transmitter of claim 6 wherein the lasers in said at least one transmitter segment are laser diodes.

11. (previously presented) An optical data receiver comprising:

a first demultiplexer for demultiplexing modulated signals on at least a first optical path;

a second demultiplexer for demultiplexing unmodulated signals on at least a second optical path; and

at least one receiver segment, said at least one receiver segment and any additional receiver segments including at least:

a photodetector for detecting demultiplexed modulated signals on the at least first optical path;

a photodetector for detecting demultiplexed unmodulated signals on the at least second optical path;

a filter array associated with each photodetector in each segment, the filter array

selecting a desired modulated tone on the at least first optical path and an associated desired unmodulated tone on the at least second optical path, the associated desired unmodulated tone being between discrete optical tones generated by an optical comb generator; and

a mixer for detecting the filtered demultiplexed modulated signals and the filtered demultiplexed unmodulated signals to recover at least a portion of data provided by a data source.

12. (original) The optical data receiver of claim 11 wherein the filter array in the data receiving portion comprises an array of bandpass filters and an array of switches for selectively enabling the filters.

13. (original) The optical data receiver of claim 12 wherein the array of switches is an array of MEM switches.

14-15. (canceled)

16. (currently amended) A method of optically modulating and transmitting source data comprising:

(a) generating an optical comb <u>using an optical comb generator, the optical comb</u> comprising optical tones having a frequency spacing equal to Δf;

(b) modulating selected ones of the optical tones in the optical comb according to the source data to produce a comb of modulated optical tones;

(c) frequency shifting at least one optical tone in the optical comb by a frequency less than Δf to produce a frequency shifted unmodulated optical reference tone;

(d) multiplexing the modulated optical tones onto a first optical path; and

(e) multiplexing the frequency shifted unmodulated optical reference tones onto a second optical path.

17. (currently amended) The method of claim 16 wherein the optical tones are ~~generated by an optical comb generator and are~~ divided into segments of optical tones, each segment of optical

tones having a frequency shifted unmodulated optical reference tone and a plurality of modulated tones, the tones of each segment being multiplexed by a segment multiplexer associated with each segment.

18. (currently amended) The method of claim 17 wherein an output of each segment multiplexer is applied to a first wavelength multiplexer and wherein the frequency shifted unmodulated optical reference tones of each segment and the optical comb generated by the optical comb generator are applied to a second wavelength multiplexer.

19. (previously presented) The method of claim 16 wherein modulating selected ones of the optical tones in the optical comb is accomplished by modulating an output of each laser in a set of lasers which are optically injection-locked to different optical tones in the optical comb.

20. (original) The method of claim 19 wherein the output of each laser in a set of lasers is modulated by direct intensity modulation of each laser.

21. (previously presented) A method of receiving and demodulating source data, which has been optically modulated and transmitted according to the method of claim 16, the method of receiving comprising:

(a) optically demultiplexing the multiplexed optical comb, the frequency shifted unmodulated optical reference tone in at least one demultiplexer;

(b) photodetecting in a first photodetector modulated tones provided via the at least one demultiplexer;

(c) photodetecting in a second photodetector unmodulated tones provided via the at least one demultiplexer; and

(d) filtering and mixing outputs of the first and second photodetectors.

22. (original) The method of claim 21 wherein the optical tones are generated by an optical comb generator and are divided into segments of optical tones, each segment of optical tones having a frequency shifted unmodulated optical reference tone and a plurality of modulated tones, the tones of each segment being multiplexed by a segment multiplexer associated with each segment

and, when demultiplexed in accordance with the aforementioned optically demultiplexing, being separated again into segments.

23. (previously presented) A data transmitter comprising:

(a) an optical comb generator for generating a comb of discrete optical tones having a frequency spacing equal to Δf;

(b) at least one transmitter segment, said at least one transmitter segment and any additional transmitter segments including at least:

(i) an array of lasers, with each laser in the array of lasers in said at least one segment being injection locked to an optical tone in the comb generated by the optical comb generator;

(ii) a data source providing data for modulating the light generated by at least a majority but less than all of the lasers in the array of lasers in each segment; and

(iii) a frequency shifter for frequency shifting at least one laser in the array of lasers in each segment, the frequency shifter cooperating with the at least one laser in the array of lasers in said at least one segment to generate a frequency-shifted unmodulated reference signal which is shifted by a value greater than 0 hertz and less than Δf.

24-25. (canceled)

26. (previously presented) The data transmitter of claim 23 wherein the light generated by the majority but less than all of the lasers in at least one segment is modulated by modulating the majority but less than all of the lasers in the array of lasers.

27. (original) The optical data transmitter of claim 23 wherein the lasers in said at least one segment are laser diodes.

28. (previously presented) The optical data transmission system of claim 1 wherein each segment of the data transmission portion also includes d) a segment multiplexer for combining outputs of the modulated lasers and the frequency shifted unmodulated reference signal in each segment.

29. (previously presented) The optical data transmission system of claim 28 wherein an output of each segment multiplexer is applied to a first wavelength multiplexer and wherein the frequency shifted unmodulated optical reference tone of each segment and the optical comb generated by the optical comb generator are applied to a second wavelength multiplexer.

30. (previously presented) The optical data transmission system of claim 1 wherein the at least two demultiplexers separate the demultiplex signals into the plurality of segments.

31. (previously presented) The optical data transmitter of claim 6 wherein said at least one transmitter segment and any additional transmitter segments also include iv) a segment multiplexer for combining outputs of the modulated lasers and the frequency shifted unmodulated reference signal in each segment.

32. (previously presented) The optical data transmitter of claim 31 wherein an output of each segment multiplexer is applied to a first wavelength multiplexer and wherein the frequency shifted unmodulated optical reference tone of each segment and the optical comb generated by the optical comb generator are applied to a second wavelength multiplexer.

33. (previously presented) The optical data receiver of claim 11 wherein the first demultiplexer and the second demultiplexer separate the modulated and unmodulated signals into the at least one receiver segments and any additional receiver segments.

34. (previously presented) The data transmitter of claim 23 wherein said at least one transmitter segment and any additional transmitter segments also include iv) a segment multiplexer for combining outputs of the modulated lasers and the frequency shifted unmodulated reference signal in each segment.

35. (previously presented) The data transmitter of claim 31 wherein an output of each segment

multiplexer is applied to a first wavelength multiplexer and wherein the frequency shifted unmodulated optical reference tone of each segment and the optical comb generated by the optical comb generator are applied to a second wavelength multiplexer.